return of all equipment sold to ineligible users for that operates on Channels 52-69. This would require these unauthorized users, the vast majority of whom purchased these expensive systems in good faith, to suffer thousands of dollars in losses. Worse, this solution would confer an unjust enrichment on the very manufacturers whose willful and knowing violation of Commission rules created this unfortunate set of circumstances. Such a result would fly in the face of the public interest, and would potentially violate the Commission's long-standing rule against unjust enrichments from use of the public airwaves.

Further, because of the vast size of the unauthorized license pool and the amounts of equipment that must be returned, the Commission must rely in the first instance on voluntary cooperation from unauthorized users. Solutions that require unauthorized uses to incur thousands of dollars in costs are unlikely to prove effective – especially where unauthorized users will justifiably feel that they are being punished for being victims of the manufacturer's illegal and deceptive marketing practices.

Fortunately, the Commission has broad authority to require the wireless manufacturers responsible for the situation to bear the cost of migrating unauthorized users to the GWMS. Under Sections 4(i), 501, 502, 503 and 510 of the Communications Act, the Commission has broad power to punish the illegal marketing or sale of wireless equipment in violation of Section 302(b). Rather than face fines of up to $11,000 per day per offense – with each piece of illegal advertising subject to an additional fine – the Commission can offer wireless microphone manufacturers a settlement under which wireless manufacturers agree to exchange old equipment for equipment that does not operate on UHF Channels 52-69. The Commission may also require these manufacturers to widely advertise the availability of the exchange program in venues designed to reach unauthorized users,

as well as requiring the manufacturers to contact all unauthorized users for which they have contact information. While unlikely to induce all unauthorized users to return all wireless equipment capable of interfering with public safety and commercial wireless systems operating on Channels 52-69, the opportunity to replace old equipment with new equipment – especially when accompanied by warnings about compliance with new FCC rules – seems reasonably calculated to secure wide cooperation.

In addition to any settlement in resolution of the complaint, the Commission has broad authority to order regulated entities such as wireless microphone manufacturers to bear the cost of interference mitigation and the cost of migrating users to the new GWMS service. *See, e.g., Mobile Communications Corporation of America*, 77 F.3d 1399, 1404-06 (D.C. Cir., 1996) (referring to Section 4(i) as the Commission's "necessary and proper" clause and finding authority to order pioneer license recipient to pay for migration of incumbent users as part of "broad power" to regulate spectrum). The Commission has used this authority to require equipment manufacturers to pay for the migration incumbents where necessary. *See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, 8 FCCRcd 6589 (1993) (Manufacturers of unlicensed PCS equipment to pay to migrate incumbents). There is no reason the Commission cannot require the existing wireless microphone manufacturers, whose conduct created a class of unauthorized users, to migrate these users to new equipment using the "necessary and proper clause" authority of Section 4(i).

To conclude, if the Commission follows the road map set out by PISC in this *Petition*, the Commission can simultaneously resolve very real concerns about interference with public safety and new commercial wireless services; permit houses of worship, theater groups and other unintentional

"radio pirates" to continue to use wireless microphones in the broadcast white spaces – but in a legal manner; smooth the pathway to authorization fo additional productive use of the broadcast white spaces in Docket No. 04-186, find a productive use for the "fallow" 5 MHz channel left over from resolution of the AWS-2/AWS-3 auctions; and require that those manufacturers that engaged in marketing of wireless microphones to the general public bear the costs associated with correcting the situation they created. It is difficult to imagine a result that could more neatly serve the public interest. The Commission should therefore grant the PISC *Petition*.

IV. INTEREST OF PISC MEMBERS

Finally, although any member of the public can file either a *Petition for Rulemaking* or an *Informal Complaint*, PISC notes that its members have significant interest in securing speedy resolution of both the complaint and the *Petition for Rulemaking*.

First and foremost, as members of the public, members of PISC organizations have the right to use wireless services on a non-interfering basis. All Commission decisions pertaining to the grant of wireless licenses under Title III have as their ultimate justification that they serve "the public interest, convenience and necessity." 47 USC §§307(a), 310(d). Even if licensees preferred to ignore the risk of interference, users such as the members of PISC still have every right to demand that the Commission address the very real risks of harmful interference described above.

Further, members of PISC have also suffered from the deceptive practices of manufacturers, and would benefit from the availability of legal wireless microphones. Many members of PISC appear as speakers at corporate events, and find themselves forced to follow a "don't ask, don't tell" policy with regard to the sound system rather than knowingly violate FCC rules. Some members of PISC organizations, such as the member organizations of EDUCAUSE and Consumer Federation

of America, have purchased wireless microphones in the good faith belief that they had every right to do so. PISC has a responsibility to find a solution for these victims of the manufacturers' illegal marketing practices.

Finally, PISC members CUWIN Foundation and the Open Source Wireless Coalition (OSWC) have a financial interest in ensuring that wireless microphones operating on UHF Channels do not interfere with the operation of C Block licenses in the 700 MHz band. OSWC represents organizations that make open source applications and equipment for wireless networks. CUWIN Foundation, a member of OSWC as well as PISC, makes open source wireless networking applications and provides information on how to create and maintain open source wireless networking hardware. OSWC members, including CUWIN, hope to develop open source applications and hardware under the "any device/any application" rules applicable to C Block licenses. The potential for harmful interference on these frequencies has an obvious and detrimental impact on their ability to create such applications and successfully market them, which also detracts from their ability to attract funding for these development projects.

For all these reasons, the members of PISC have significant interest in seeing the Commission resolve the current state of affairs with wireless microphones as quickly as possible, and in the manner set forth by PISC in the complaint and *Petition for Rulemaking*.

CONCLUSION

WHEREFORE, the Commission should initiate an investigation into the conduct of the manufacturers listed in the complaint, and grant the *Petition for Rulemaking*.

Respectfully submitted,

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July 16, 2008

Exhibit A

(Shure Houses of Worship Guide)

A Shure Educational Publication

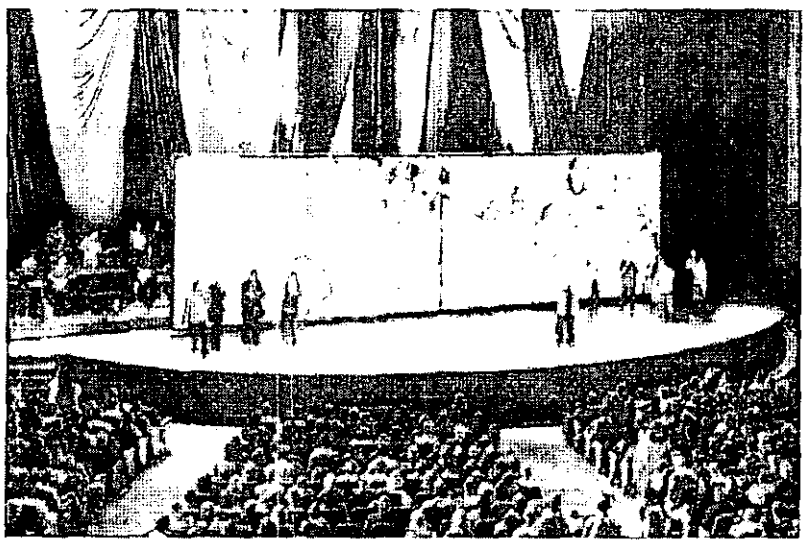
Wireless Microphone Systems

and

Personal Monitor Systems

for

Houses of Worship



By Doug Gould and
Crispin Tapia

SHURE

Chapter 1: INTRODUCTION

There's a strong sense of presence as the circle of bowed heads and clasped hands breaks, ready to meet the challenge of the day.

As the worship leader observes the eyes and faces of each member of the team – from the pastor to the back-up vocalists – he senses a peace and a confidence knowing that they've done their job of practice and preparation and that every note is in place.

As they mount the platform and begin the service, they immediately see – and feel – that they have made a connection with the worshippers in attendance.

Certainly the worship team has done their part to assure a meaningful message is delivered. However, there is even more here than meets the eye...or the ear. There is also audio technology.

Audio technology that ...

- Lets the praise and worship leader hear a consistent mix, sing at levels that are comfortable, and be heard clearly from anywhere on the platform.
- Gives the musicians the ability to choose which mixes they want to hear and the confidence that their instruments are perfectly complementing the complete sound.
- Removes the tangle of cords, cleaning up the platform and allowing everyone to concentrate on the worship.
- Actually makes the service easier and simpler from a technical standpoint.
- Puts more control at the fingertips of the users.
- Cleans up the front-of-house sound and helps provide the same clarity throughout the sanctuary.
- Enables discreet communications between the praise and worship leaders and the musicians ... the audio and media ministers with praise and worship leaders and musicians ... the pastor and the team.

Houses of Worship Guide

The purpose of this booklet

The goal of this booklet is to provide a solid understanding of the selection and operation of three key audio technologies used to create an optimal sound platform for your house of worship.

These technologies are:

- Wireless microphone systems – to untether the pastor and musicians from their fixed spots on the stage without sacrificing any sound clarity,
- Personal monitoring systems – to allow the singers and musicians to hear the mixes they want at levels that are comfortable to them, and
- Earphones – to provide better sound isolation and aesthetics for all who use them.

Of course there are additional advantages to wireless microphones, personal monitoring systems and earphones. There are also some tips and techniques to make it easier for you to incorporate them into your worship service.

We hope that by the time you reach the end of this booklet, you...

1. more fully understand the benefits and applications of these increasingly-popular audio products,
2. gain some insights into how to select the system or systems that match your specific needs and budget, and
3. learn some ways to use these products most effectively.

For those interested in further discussions on wireless microphone systems, personal monitors and earphones or sound reinforcement in general, Shure offers a full range of educational publications for both experts and novices alike. You can find more information about our complimentary guides in Chapter VI of this booklet or view the entire list at ***www.shure.com/literature***. Additionally, Shure applications engineers are always available to answer your specific questions and concerns. For more personal attention, simply call your local Shure office at one of the numbers listed on the back of this booklet.

We, at Shure, fully understand that our audio solutions are simply a conduit between your faith and your congregation. We hope this booklet helps you better understand how you can use today's technologies to express your worship more clearly and more easily.

Why it's a good time to learn more about wireless microphone systems and personal monitors

These innovative audio products have gone through a dramatic change in the past few years. The costs for these systems have decreased considerably and their features have become more sophisticated, more user-friendly and far more adaptable to the widest range of needs.

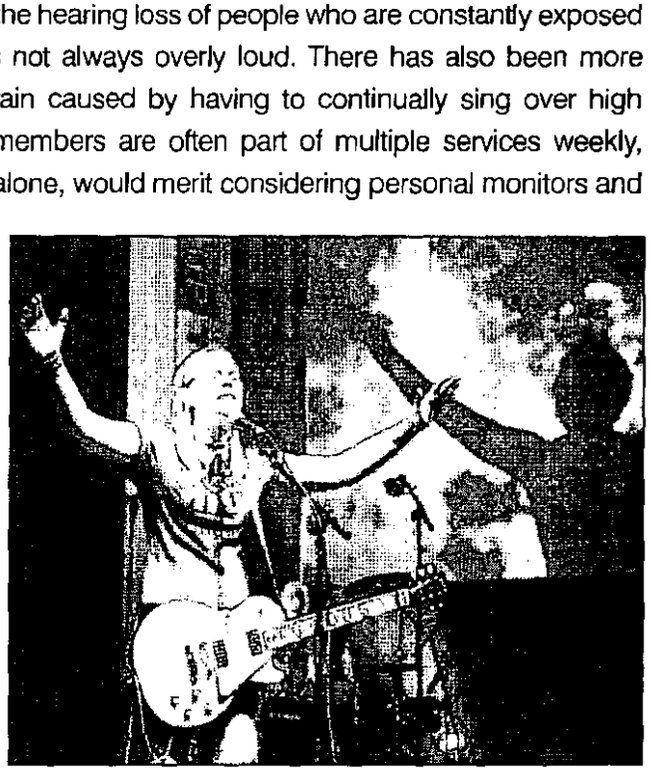
Therefore, it is now possible for people who are less technical and have smaller budgets to use these audio products to provide dramatically improved sound for the congregation as well as more control and flexibility for the praise and worship team.

It has also become far easier for less technical users to gain the benefits of these systems without the long learning curve once associated with wireless microphone systems and personal monitors.

Houses of worship have unique audio challenges and needs that are easily addressed by wireless microphone systems and personal monitors. These include the configuration of the space itself, as well as the various expectations and desires of the worship team and the worshippers.

There are two more reasons to consider upgrading your sound platform to include these technologies: *hearing conservation and vocal strain*. There has been a great deal of research lately on the hearing loss of people who are constantly exposed to sound, even if the sound is not always overly loud. There has also been more understanding of the vocal strain caused by having to continually sing over high volume. Since worship team members are often part of multiple services weekly, if not daily, these two reasons, alone, would merit considering personal monitors and earphones for your services.

All in all, the benefits of including wireless microphone systems and personal monitors into your house of worship will likely more than pay for themselves in the added richness of the overall sound for your congregation and the increased control for those who use them.



Chapter II:

WIRELESS MICROPHONE SYSTEMS

Descriptions/Types

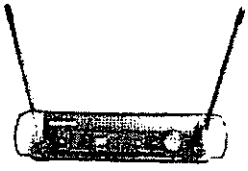
Before we can get into the advantages of 'unplugging' your worship team or any tips and techniques for getting as much as you can from your wireless microphone systems, it's a good idea to get a basic understanding of their components and operating concepts.

This first section includes a brief overview of wireless microphone systems in order to add some context to the components or technical aspects we discuss later in this chapter.

Wireless microphone systems include three components:

1. a microphone (or an input device such as a guitar pickup),
2. a transmitter, and
3. a receiver.

Example of a handheld transmitter



Example of a wireless receiver

Example of a bodypack transmitter

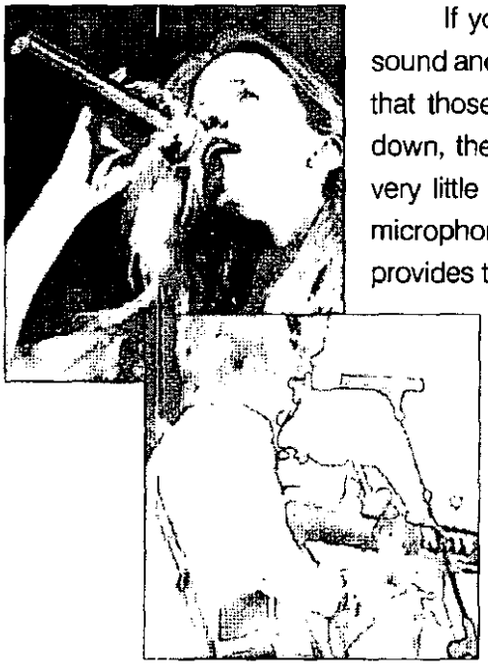
1. The *microphone* (or pick-up) can be any of the following:
   - a handheld microphone (often, this will have the transmitter built into its base)
   - a headworn vocal microphone
   - a lavaliere (lapel) vocal microphone
   - a clip-on instrument mic
   - a guitar/bass pickup (which replaces the microphone since it is a direct output to the transmitter via a cable.)
2. The *transmitter* is either built into the base of the microphone, as is the case with a wireless microphone, or is a body pack that clips onto the belt or clothing of the user. Its function is to convert the audio signal from the microphone to a radio signal and send this signal to the receiver.

Important to note: These radio signals are sent from the transmitter to the receiver on a predetermined radio frequency – in the same way your local radio and television stations transmit their broadcasts.

3. The *receiver* is placed in a location that can easily receive the transmitted radio waves. The receiver's output cable is plugged into the sound system in the same place you would plug the cable from a wired microphone.

The key difference between a wired and wireless microphone system is that the user of a wireless system is not attached to the cable – making him or her free to roam the worship space unhindered.

The benefits to using wireless microphone systems in a House of Worship



If you think wireless microphone systems have sound and clarity issues, then you will be happy to hear that those days are gone. As the prices have come down, the quality and features have increased. With very little effort you should be able to find a wireless microphone system that you can afford and which provides the sound quality you desire.

However, it is far more likely you are already using wireless microphones in your house of worship, so we will spend most of this chapter discussing ways you can increase the value of having these systems and who might benefit from them the most.

The initial advantages of wireless microphones in a house of worship are fairly apparent:

1. Cable-free mobility for the pastor, worship leader and worship musicians
2. Fewer cables, which provides a cleaner, less cumbersome worship space

Let's look at these two main advantages individually.

Greater mobility – As praise bands become more elaborate and the congregations' expectations of more interaction increases, other musicians, such as the horn player and the guitarist, are finding that the cable on the wired microphone is limiting their ability to bring their worship closer to – and often into – the congregation.

Additionally, the pastor might want to lend a voice to the praise band. With a wireless microphone, he or she can simply walk across the platform and join in.

A cleaner worship space – Again, as praise bands become more elaborate, as more and more guest speakers are added to the platform, the number of people who need to be miked increases. This results in the need for more and more microphone cables and stands.

Wireless systems eliminate the cables on the platform and allow new presenters and musicians to join the celebration without adding yet another cable to the clutter.

For example: you want to feature a member of the choir in the song. Simply hand her the pre-set wireless microphone and she can walk forward on the platform and add her voice to the worship without adding another cable to the stage.

Then, when her part is over, she can hand the microphone to the next featured singer or step back and rejoin the choir.

Let's look at a few basic set-ups for the people we have mentioned thus far:

A pastor

Any of the following:

1. A handheld microphone with a built-in transmitter
2. A headset microphone with a bodypack transmitter
3. A lavaliere microphone with a bodypack transmitter

Why the pastor's best option is a headset microphone:

The closer you can position the microphone to the sound source, in this case the pastor's mouth, the better.

A lavaliere microphone is usually attached to the robe or lapel, which positions the microphone a few inches away from the sound source and not in the sound's direct path. For this reason, the sound is not as clear and becomes softer and louder when the pastor looks from side to side or up and down.

A headset microphone allows you to position the microphone right at the pastor's mouth or jaw line. When the pastor looks left or right – or even swivels to look behind – the microphone stays positioned directly in front of the mouth and the sound level remains the same.

It also enables higher gain-before-feedback. This lets you increase the pastor's volume level – as needed of course – with less risk of feedback. Since placing

microphones as close to the sound sources as possible is the best way to avoid feedback, a headset microphone is a better choice for this reason than a lavaliere.

Many pastors might object to the headset microphone for aesthetic reasons and there is very little reason to argue this point. But if you want to convince your pastor to go this route, you might want to try this little test: make recordings of two rehearsals, one using a lavaliere microphone and one using a headset. When you play the recordings back, the pastor should hear the dramatic difference in sound clarity and consistency and can then decide just how much sound quality is being traded for aesthetics.

Also: headset microphones now come in a variety of colors and profiles. You might want to try to find one that matches the pastor's skin color and is less apparent to the congregation.

A praise leader

Same choices as the pastor.

A guitar or bass player

Short instrument cable and a bodypack transmitter

A few words on wireless systems for guitar players:

In the past, wireless systems provided less than optimal sound reproduction for guitar players, especially bass players. Current wireless systems, with their ability to faithfully reproduce the lower ranges, come far closer to matching the sound you get from a wired version. More sophisticated models can actually provide sound that is indistinguishable from a wired microphone.

This means you have the confidence to help when the bass player asks, "Can you do something about all these wires?"

A horn or woodwind player

Clip-on instrument mic and a bodypack transmitter

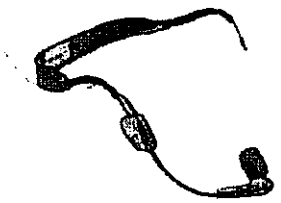
Guest presenters and a spare system

Often, you will find you need another wireless system for a special guest or additional singer, for example. Since it is hard to determine beforehand what you need or what their microphone preference might be, it's best to get a system that includes multiple microphone choices, such as headset, lavaliere, and a hand-held mic.

But remember that each additional microphone will still need its own dedicated receiver.

Drummers, keyboard players, and choir members

Since not everyone on the platform will benefit from the added freedom of wireless, you should consider the "Mobility Test" (See Chapter V) before rushing to provide each musician and singer with a system of his or her own. Our recommendation is that anyone who is assigned a fixed position on the platform (such as drummers, keyboard players and choir members) be provided with wired microphones. While the cost for wireless systems has decreased and the ease-of-use has increased, there is still no reason to provide a wireless system to anyone who will not benefit from the lack of wires.



Example of a wireless headworn microphone

Even more applications for wireless microphone systems:

Congregation participation

A handheld wireless microphone gives the pastor and the praise leader the opportunity to let one or more of the members of the congregation add a few words ... sing one or two lines of a hymn ... or express an "Amen!" for all to hear.

Example of a wireless lavalier (lapel clip-on microphone)

Going from the lobby to the platform

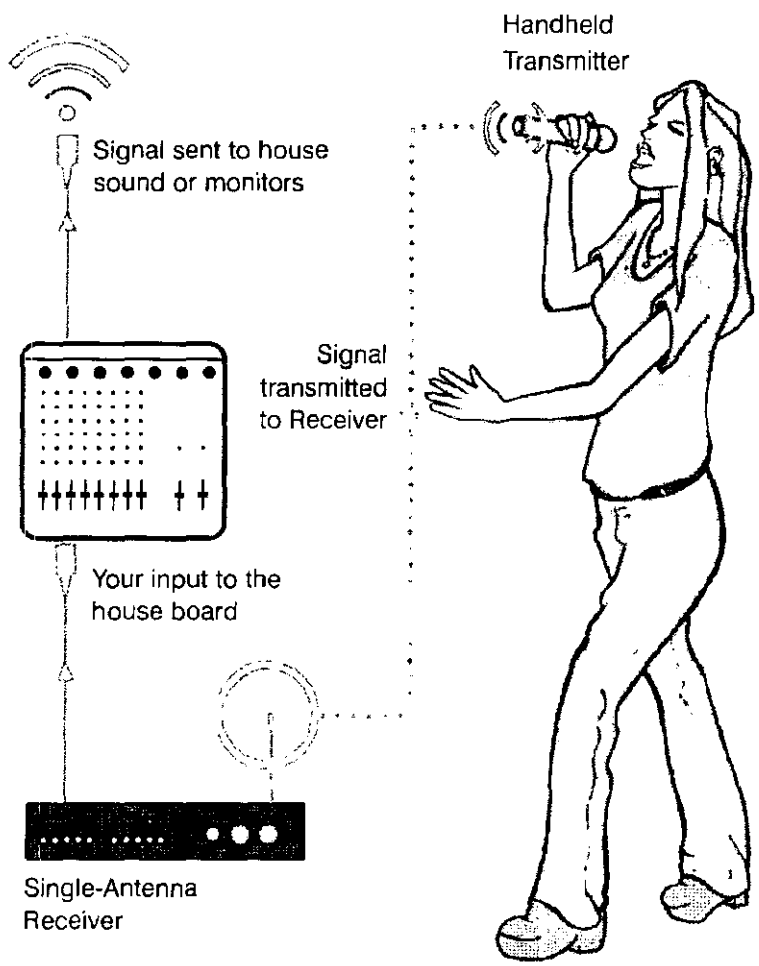
More and more pastors are greeting the congregation as they arrive. Why shouldn't they be able to be heard by the entire congregation while doing so? With a wireless microphone system (and remote antennas), the pastor can be in the lobby or even outside while preaching to those already seated.

Then, as the last of the congregation arrives, he can begin the sermon as he walks into the main area, down the aisle and onto the platform.

Example of a wireless guitar cable

Wireless Microphone System:

Handheld User



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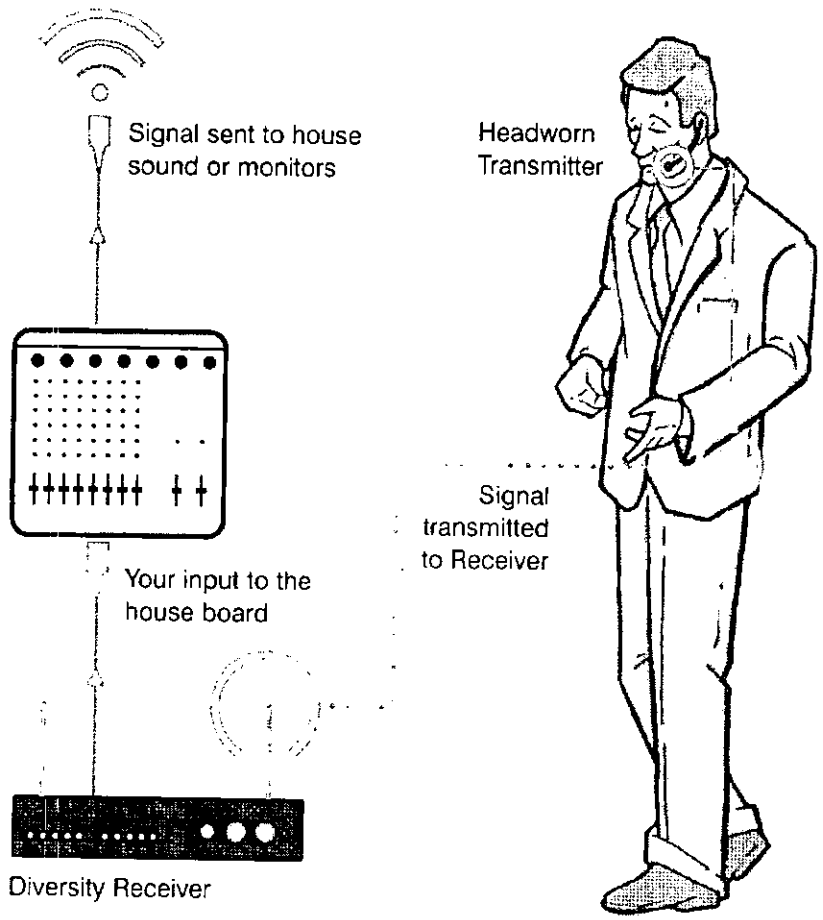
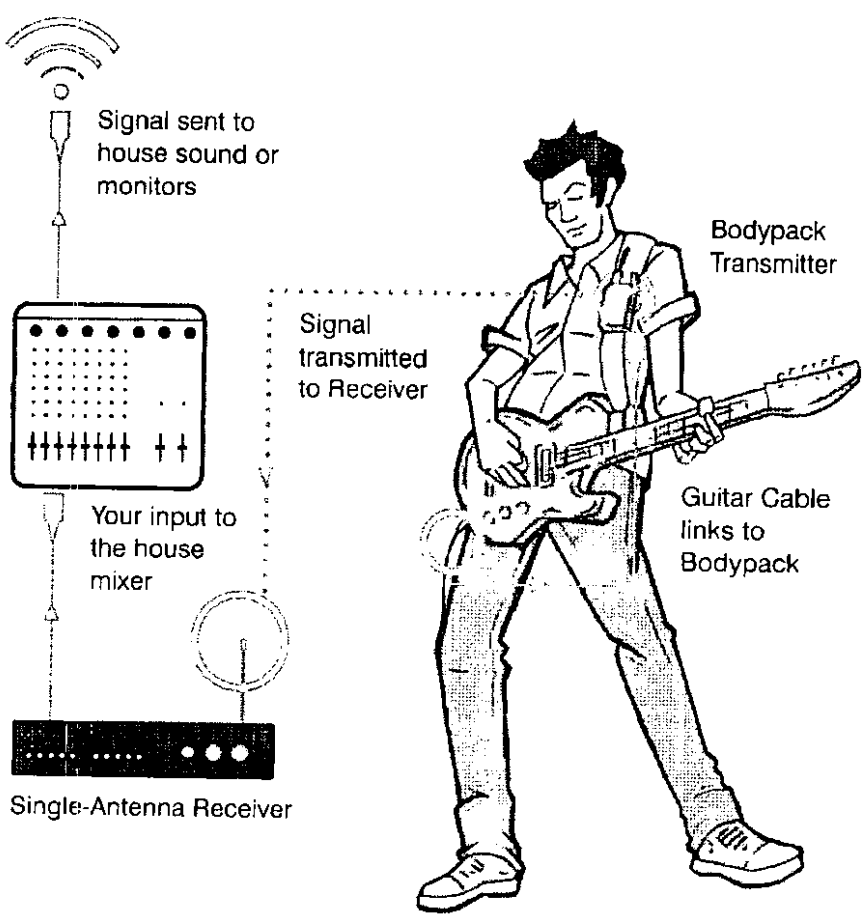
Wireless Microphone System:

Headworn User



Wireless Microphone System:

Guitarist/Bass



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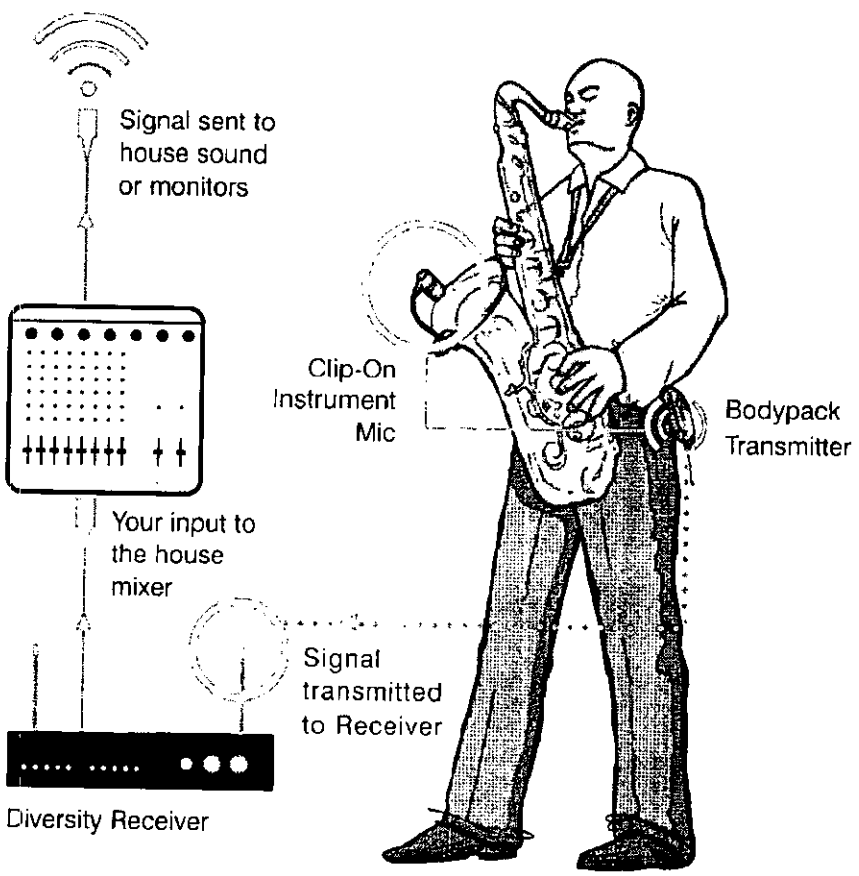
Wireless Microphone System:

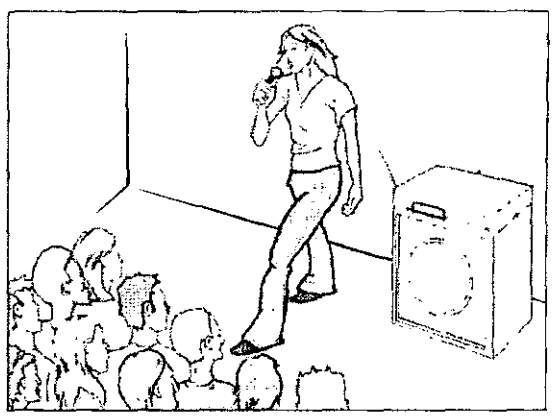
Instrumental User



Outreach systems

Wireless microphone systems can also be used outside of the house of worship, either for dedications on the grounds or for taking into the community. In situations such as these, they greatly increase mobility and crowd participation without adding any complicated wiring.

Imagine having the sound system with loudspeakers and other sound equipment against a wall 10-20 feet away from where people might walk. Then imagine using a wireless microphone system to eliminate the cable that connects the pastor to the speakers. Now you have optimum flexibility for your event and no wires for anyone to trip over.



Example of an outreach system

Other areas, live events, and portable churches

Wireless microphone systems are also perfect for other house of worship activities and events such as theater productions, skits, and more. All the same advantages ... none of the cables. This makes for a more aesthetically appealing presentation, especially for holiday pageants.

They are also optimum for 'portable churches,' which rent space or move from location to location, since they eliminate any need to run wires and making packing up easier and faster. [See Chapter V for a further discussion on mobility for portable churches.]

Holiday pageants and wireless lavaliere microphones.

Through advances in wireless microphone technology, and the availability of more affordable systems, your holiday pageants can now include the freedom of movement that was formerly only available to professional theaters.

Bodypack transmitters are small and easy to conceal. Also, you can have many wireless systems in use at once. All this makes wireless microphones a great way to provide exceptional audio for all the main speaking and singing roles.

While we suggested earlier that you consider a headset microphone for your pastor, we suggest that you use lavalieres for your theater productions. They are easy to hide in costumes and wigs. They can even be taped right to a pair of glasses! This allows the congregation to hear each player clearly without seeing the microphones.

It also allows each person to concentrate on what is important: the production, not the microphone!

Additionally, wireless microphone systems can provide cordless sound to meeting rooms and fellowship halls, especially where people might be asking questions of the speakers. With wireless microphones, participants can share their experiences without having to shuffle out of their seats to where a wired microphone might be located.

Wireless microphones are perfect when it is more convenient and less disruptive for the microphone to go to the talker instead of the talker to the microphone.

Some considerations and technical details for more effective wireless operation

Frequency Ranges

Every wireless microphone system transmits and receives sound on a specific radio frequency. These frequencies are mainly grouped into two large bands, or ranges: VHF and UHF.

VHF means very high frequency and UHF means ultra high frequency. Each of these ranges has their advantages and limits. To understand the "whys" of frequency limitations would require a fairly technical discussion (see "Additional Resources" for guides on where to learn more), but for the purposes of selecting the proper wireless system, there are some simple guidelines and useful generalities:

- Each wireless system must be on a different frequency.
- Most wireless microphones share the same frequencies used by TV stations, both VHF and UHF. Since TV stations are much more powerful than wireless microphones – and since the Federal Communications Commission (FCC) requires you to do so – you need to avoid local TV channels.
- You also have to avoid frequencies that are already used within your house of worship or those in use by other organizations nearby.
- Most manufacturers have online tools to help you select the best range based on your model and location. They can also help select the right frequencies when multiple systems are used.

UHF vs. VHF. What is the difference and which should I select?

First of all, while there are some differences in the radio behavior of VHF and UHF systems, there is no inherent difference in audio quality. The quality of the wireless system itself makes the largest difference to the quality of the sound. And, yes, you can use both VHF and UHF systems in the same location.

That being said, there are some generalities that might help you better determine which option is best for you.

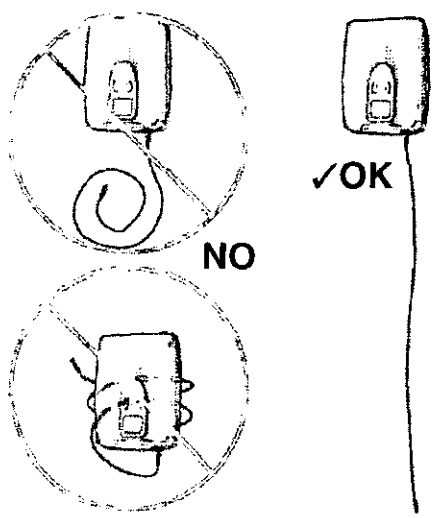
- **UHF is usually recommended if**... You need to use more than 5 or 6 wireless systems at the same time; You use them in "crowded" radio environments such as cities or places where there are many other houses of worship nearby; You want the flexibility to take your system to other US cities; You're able to spend a little extra funds to enable flexibility for future needs.
- **VHF is usually recommended if**...You use fewer than 5 systems at the same time; You use them in "open" (less crowded) radio environments; You do not plan to take your system outside of your local area; your budget is more limited.

Receiver and antenna placement

Wireless microphone systems include antennas on both the receiver and transmitter.

Antennas range in shape, size and even quantity. Some can be obvious; such as on bodypack transmitters, while others are located internally; such as for many handheld transmitters. Some receivers, for example, have two antennas (called *diversity*) while others only have one (called *non-diversity*).

Here, again, the discussion can quickly become technical, so we have outlined a few basic principles to help you avoid interference and increase the likelihood you will get clear audio.



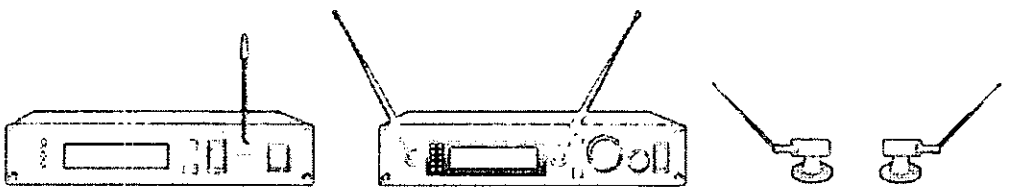
Proper and improper antenna positions

- Antennas of bodypacks should always be kept as clear as possible from obstructive surfaces or materials. Never curl up the antenna into a pocket, or wrap it around the bodypack.
- Remote or receiver antennas should be placed above the congregation or other obstructions so the transmitter and the receiving antenna can 'see' each other. This is called 'line of sight.'
- Never let antennas touch one another.

- When mounting receivers onto racks:

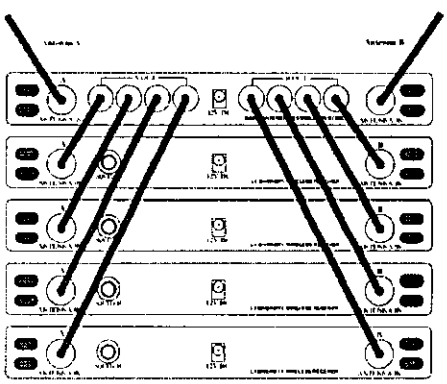
  1. keep them a few feet or rack spaces away from CD/DAT, DSP, and digital effects units as this may cause interference and

  2. make sure you have not compromised 'line of sight,' which usually means you should mount the antennas in the front.



Example of a single antenna receiver Example of a diversity receiver Example of a remote antenna

- Single antenna receivers are usually more affordable, but they are also more susceptible to loss of signal (called dropouts).
- Diversity receivers provide superior performance in any environment and when budget allows, are preferable.
- Remote antennas are recommended when wireless microphone systems are being used in more than one location (such as when the pastor walks in from outside, through the lobby and into the auditorium).
- For locations where a great number of wireless microphone systems are being operated at once, you can use an antenna distribution system. An antenna distribution system reduces the total number of antennas needed and can help improve overall performance.



Antenna distribution system

Power

Unlike wired microphones, all wireless microphone transmitters require batteries. As the batteries run down, the performance of the wireless system begins to suffer. For this reason, keep these tips in mind:

- Use fresh batteries. Weak batteries can cause short range and distortion.
- Check your batteries before each service. We actually recommend using new batteries for each service.

- Alkaline batteries are recommended since they provide longer, more consistent life than rechargeable or basic (carbon-zinc) batteries for wireless applications. While lithium batteries can last longer, the difference in cost might not be worth the additional life.
- Rechargeable batteries are not desirable as they usually last less than three hours and are not as strong initially as alkaline batteries. In fact, rechargeable batteries don't typically start with enough power needed for a wireless system, 7.2 volts out of the box vs. 9 volts from a fresh alkaline.

Remember that a wireless system is only as good as its ability to transmit signals from the microphone to the receiver. The weaker the batteries, the weaker the signal.

How to select the right wireless microphone systems for your House of Worship

While the best idea is always to discuss your requirements with a sound contractor or an applications specialist at the manufacturer before making a final decision, it's generally just a matter of asking yourself four questions:

1. ***Which microphone/transmitter configurations best fit our needs?***

   Earlier we have shown the components of a wireless system and some of the set-ups that best fit the individuals who might be using them. Count the number of users and/or rooms that might require any of the following configurations:

   - Handheld microphone (with built-in transmitter)
   - Headworn microphone with bodypack
   - Lavaliere microphone with bodypack
   - Clip-on microphone with bodypack
   - Instrument cable with bodypack

2. ***Where do we intend to use our wireless systems? One location? Many locations?***

   One location – If you intend to use your wireless microphone system(s) in one location, you only need to make sure you select a system that operates on frequencies compatible with your locations VHF or UHF broadcast TV channel frequencies.

   Multiple locations – If you intend to use your wireless system(s) in different towns or neighborhoods, you will likely encounter different active TV channels. Here, you should make sure your system(s) are frequency-agile (that is, allow you to change frequencies as you move from location to location).

You will also want to consider mounting your receiver(s) in a small rack case to make it easier to transport – especially if you are bringing more than one wireless system with you.

International – Very few wireless microphone systems work worldwide. If you are planning to use your wireless systems in foreign locations, you need to be even more careful about frequency selection (especially since you might be violating the laws of that country by operating on reserved frequencies). It is best to rent or borrow systems in other countries.

Tip: ***visit www.shure.com/frequency*** to learn more about which frequency ranges are best for your requirements.

3. *Do we need one system or many systems?*

One system – if you are operating one system in a location where no other wireless systems are in use, then you will not have any multisystem needs to manage.

Multiple systems – If you plan to use more than one wireless system, you will need to carefully select frequencies to make sure that each system is compatible with the others. Also, there is a limit to the number of wireless systems that can be used in one location, which brings us to the final consideration:

4. *How much do we want to spend?*

The adage that you 'get what you pay for' holds true with wireless systems. While the prices have come down and the features have improved, you still need to weigh your budget against your needs – especially when you are buying multiple systems for one location.

Better wireless systems allow you to operate more units at the same time without interference and are able to operate across larger bands of frequencies.

The key to any wireless system is the confidence you have in its ability to provide sound clarity that rivals its wired cousins. Your need for user-friendly features to locate open frequencies, avoid dropouts, and get clear consistent sound has not gone unnoticed by the manufacturers of these systems. More and more wireless systems are now including increasingly sophisticated technologies, such as 'autoscan' and 'Audio Reference Companding,' to help users get the sound and signal they want without having to worry about the technical issues. Before making any major system purchases, you might want to spend a little time researching the latest features and comparing their costs and benefits to your needs and budget.

The last word on wireless:

Obviously the most important issue to keep in mind when making any decision about sound equipment for your facility is the benefit to the congregation. With all things being equal as far as what is heard, you should appreciate that the advantages of wireless are visual as well as audible; the front of the platform looks neater without all the cables. And giving your vocalists, pastors or worship leaders the freedom to move around and concentrate on their message could add significantly to the impact of a service.

Questions about wireless microphone systems:

This booklet was created as a direct result of the many questions we, at Shure, have received from the House of Worship community about wireless microphone systems, personal monitoring systems and earphones. We have tried to answer most of these questions within the text itself, but some did not quite fit, were questions about our proprietary solutions, or required a more direct response. Answers to these questions are included in the Questions and Answers sections at the end of the three main chapters. If you do not see the answers to your specific questions, you will find more in Chapter VI, *Taking Your Sound To The Next Level.*

Is there anything specific to a House of Worship that might cause interference?

Yes. The house of worship across the street or any other organization within 100 yards might also be using wireless microphone systems. These systems could be set on frequencies that interfere with yours. If you suspect they might be using wireless systems, you should ask them which frequencies they are using and avoid these when selecting your systems.

Additional sources of interference include:

- robes with a significant amount of metal threading
- digital devices or digital processors (such as CD or DAT players/recorders, DVD players, computers, Digital Signal Processors) located too near the wireless receivers

How many wireless systems can I use at one time?

This varies by frequency, model and manufacturer. While you can use a significant number of total wireless systems at the same time you need to be careful to coordinate the frequencies correctly. This is covered somewhat within this booklet, but it's best to contact a sound contractor, your audio representative, or the manufacturer if you want to use more than the number of microphones indicated by the model you choose.